

APPLICATION FOR  
UNITED STATES LETTERS PATENT  
SPECIFICATION

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TO ALL WHOM IT MAY CONCERN:

Be it known that we, Frank Becker, residing in Berlin, Germany, Martin Kurth, residing in Berlin, Germany, and Thomas Krügerke, residing in Berlin, Germany, all citizens of Germany, have invented a new and useful "METHOD AND APPARATUS FOR PRODUCING A RESPIRATORY FILTER", of which the following is a specification.

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# METHOD AND APPARATUS FOR PRODUCING A RESPIRATORY FILTER

## BACKGROUND OF THE INVENTION

### FIELD OF THE INVENTION

This invention relates to a respiration filter made of a matrix-bonded filter medium, particularly of activated carbon and a method of producing such a filter.

### BACKGROUND ART

Such filters are known. Thus, U.S. 5,078,132 describes the manufacturing of a respirator in which the absorbent granules are combined with polymeric binder. This is done while pressing cylindrical and shell-shaped molded pieces. These molded pieces are then incorporated as filtration elements in a mask and are rigidly mounted to it.

A polymer-bonded granular adsorbent, absorbent, chemisorptive, or catalytic material and a method for producing molded pieces from it is known from DE 197 14 350 A1. A meltable polyethylene is intensely wetted with an oligocondensate in an appropriate mixing vessel, the fine-granular adsorbent, absorbent, chemisorptive, or catalytic material is added and the resulting mixture mixed intensely, then fed to a processing machine using a suitable conveying system and pressed into a molded piece inside a mold at temperatures in the range from 90° to 180° C, preferably 100° to 140° C, and pressures in the range of 0.0125 to 0.25 bar/cm<sup>2</sup>, preferably 0,0225 to 0,0625 bar/cm<sup>2</sup>, cooled in the mold and then removed from it. Using such molded pieces as filter elements for respiratory masks comprises a disadvantage in that their gastight fitting into inserts of respiratory masks or bonnets takes some process engineering effort. Furthermore, the mechanical stability of these molded pieces is limited along their edges.

### SUMMARY OF THE INVENTION

It is an objective of this invention to condition a matrix-bonded filter medium such as matrix-bonded activated carbon for cost-effective and reliable use in respiratory equipment, particularly respiratory masks and bonnets.

The method according to the invention for producing a respiratory filter in which a granular adsorbent, absorbent, chemisorptive, or catalytic material, particularly activated carbon, is intermixed with (a) meltable polymer(s) that may have been wetted to retain homogeneities, and the resulting mixture is heated under pressure and pressed into a molded piece involves that said mixture is heated under pressure in a connecting part for a respirator or fan filter unit or a connecting part of an adapter for a respirator or fan filter unit and is thereby positively or non-positively pressed to it, and that the fit between said connecting part and the compacted mixture is gastight. Accordingly, the old for the apparatus of the invention is a connecting part for a respirator, a fan filter, or an adapter for these.

The connecting part is preferably ring-shaped and comprises a complete or partial groove or tongue on its inner surface which the compacted mold piece engages in or partially encloses, respectively. The connecting part may also have an oval, rectangular, or other geometries. The connecting part comprises fasteners on its periphery for a detachable gastight connection to a respirator or fan filter unit or for gastight connection to an adapter for a respirator or fan filter unit. The adapter connection may also be designed as a detachable connection. The connecting part is preferably made of a polymer with a higher melting point than the polymer(s) of the molded piece, or of cardboard or metal.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The Figure is an exploded, cross-sectional view of a respiratory filter, according to the invention.

#### DETAILED DESCRIPTION OF THE DRAWINGS

The Figure shows that the mold for a respiratory filter consists of a connecting part 1 in which a mixture of a granular adsorbent, absorbent, chemisorptive, or catalytic material, particularly activated carbon, and (a) meltable polymer(s) is heated under pressure and thus pressed into a molded piece 2. There is a positive and/or non-positive gastight connection between the connecting part 1 and the compacted molded piece 2.

The connecting part 1, which is ring-shaped here, has a circulatory tongue 5 along its inner surface that is partially enclosed by the molded piece 2. This ensures a highly stable connection of connecting part 1/molded piece 2.

The connecting part 1 comprises fasteners 3 along its periphery for a detachable gastight connection to an adapter 4 for connecting a respirator or fan filter unit. The figure depicts this connection as a snap-in connection. It may also be designed as another conventional connection such as threaded, quarter-turn fastener, etc.

Instead of a connection to the adapter 4, a respirator or fan filter unit may also be connected using a direct detachable gastight connection.

Thus, the connecting part 1 has three functions: It holds the matrix-bonded activated carbon, it guides the air to be filtered through the matrix-bonded activated carbon, and it provides a detachable gastight connection to a respirator or fan filter unit or an adapter 4. The detachable connection facilitates safe and simple replacement of the respiratory filters.